ID de Contribution: **31** Type: **Non spécifié**

Extending Bayesian Optimization software in Julia

jeudi 5 octobre 2023 13:30 (30 minutes)

Bayesian optimization is a family of methods for sample efficient optimization of noisy, black box, expensive to evaluate functions. The approach of these methods is to maintain a random field, usually a Gaussian process, to model uncertainties in values of the objective function. This model is refined throughout optimization and is used for deciding where to evaluate the objective function next. The package BayesianOptimization.jl currently provides an implementation of traditional methods that work well for low dimensional problems. The goal of our project is to refactor and to extend the package such that it serves as a framework for implementing novel algorithms from this family and provides user-friendly implementations of successful algorithms. We are currently developing the framework and merging the implementation of traditional methods and a new implementation of Trust region Bayesian Optimization (TuRBO) algorithm into the framework. TuRBO belongs to recent developments in Bayesian optimization that aim to work well for higher dimensional problems. Some prominent use cases include hyperparameter tuning of algorithms and optimization problems where the objective is given by some expensive simulation. Samuel Belko is enrolled in a master's program in mathematics at Technical University of Munich. He works during the Google Summer of Code 2023 on BayesianOptimization.jl under the supervision of Johanni Brea.

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Classification de Session: Posters